CLAIMS

1. A lens assembly for imaging an object, the lens assembly comprising:

a plurality of lenses adapted to provide:

1) a field of view of approximately 40 degrees; and

2) a distortion of less than approximately 1%.

2. The lens assembly of claim 1, further comprising:

at least one filter plate;

wherein the plurality of lenses is further adapted to produce at least one aberration to compensate an aberration produced by the at least one filter plate.

3. The lens assembly of claim 1, wherein the plurality of lenses is further adapted to provide a ratio of the length of the lens assembly to the back focal length of approximately 1.39.

4. The lens assembly of claim 1, wherein the lens assembly further comprises:

an aperture stop; and

wherein the plurality of lenses is configured symmetrically about the aperture stop.

5. The lens assembly of claim 1, wherein the plurality of lenses is arranged to define a total length, the total length is between approximately .95 and approximately 1.02 of the focal length.

6. The lens assembly of claim 1, in combination with an imaging device.

7. The lens assembly of claim 6, wherein the imaging device is a security camera.

8. The lens assembly of claim 1, wherein the plurality of lenses comprises:

a first lens group having at least one first lens element, the at least one first lens element having a first surface proximal to the object and a second surface distal to the object; and

a second lens group having at least one second lens element, the at least one second lens element having a first surface proximal to the object and second surface distal to the object.

9. The lens assembly of claim 8, further comprising:

an aperture stop disposed between the first lens group and the second lens group.

10. The lens assembly of claim 9, wherein the aperture stop has a fixed size selectable from a range of aperture stop sizes.

11. The lens assembly of claim 9, wherein the aperture stop is physically contacted by at least one lens of the plurality of lenses.

12. The lens assembly of claim 8, wherein the first and second lens groups are arranged to define a focal length, and wherein a distance between the first surface of the at least one first lens element and the second surface of the at least one second lens element is less than approximately 95% of the focal length.

13. The lens assembly of claim 12, wherein the total length is between approximately .95 and approximately 1.02 of the focal length.

14. The lens assembly of claim 8, wherein the image of the object is produced on an image plane, the lens assembly further comprising:

at least one filter disposed between the at least one second lens element and the image plane.

15. The lens assembly of claim 14, wherein the at least one filter is a planar filter.

16. The lens assembly of claim 14, wherein the plurality of lenses is further adapted to produce at least one aberration to compensate an aberration produced by the filter.

17. The lens assembly of claim 8, further comprising:

a third lens group having at least one first lens element, the at least one first lens element having a first surface proximal to the object and second surface distal to the object; and

a fourth lens group having at least one second lens element, the at least one second lens element having a first surface proximal to the object and a second surface distal to the object.

18. The lens assembly of claim 17, wherein the first, second, third, and fourth lens groups define a double-Gauss-type lens assembly.

19. The lens assembly of claim 17, further comprising:

an aperture stop, wherein the aperture stop is disposed between the third lens group and the fourth lens group.

20. The lens assembly of claim 19, wherein the third lens group is disposed on a same side relative to the aperture stop as is the first lens group.

21. The lens assembly of claim 20, wherein the third lens group includes a third lens element and a fourth lens element.

22. The lens assembly of claim 21, wherein the third lens element is a positive lens element, and the fourth lens element is a negative lens element.

23. The lens assembly of claim 20, wherein the fourth lens group includes a fifth lens element and a sixth lens element.

24. The lens assembly of claim 23, wherein the fifth lens element is a positive lens element and the sixth lens element is a negative lens element.

25. The lens assembly of claim 1, wherein the lens assembly is housed within a housing having step locations to receive the plurality of lenses.

26. The lens assembly of claim 25, wherein the housing further has an outer surface including flats for affixing a tool thereto.

27. The lens assembly of claim 24, wherein each of the step locations has a thickness chosen to ensure proper spacing of the plurality of lenses.

28. A lens assembly for imaging an object, the lens assembly comprising:

a first lens group having at least one first lens element, the at least one first lens element having a first surface proximal to the object and second surface distal to the object;

a second lens group having at least one second lens element, the at least one second lens element having a first surface proximal to the object and second surface distal to the object; and

an aperture stop disposed between the first lens group and the second lens group;

wherein the first and second lens groups are arranged to define a focal length, and wherein a distance between the first surface of the at least one first lens element and the second surface of the at least one second lens element is less than approximately 95% of the focal length.

29. The lens assembly of claim 28, wherein the total length of the lens assembly is between approximately .95 and approximately 1.02 of the focal length.

30. The lens assembly of claim 28, further comprising:

a housing having an aperture stop location at a position fixed relative to the housing; and

wherein the aperture stop disposed between the first lens group and the second lens group has an aperture stop size selectable from a plurality of aperture stop sizes, and wherein the aperture stop is disposed at the fixed position of the aperture stop location, independent of the aperture stop size.

31. The lens assembly of claim 28, further comprising:

a housing having an aperture stop location at a position fixed relative to the housing; and

wherein the aperture stop disposed between the first lens group and the second lens group has an aperture stop size selectable from a plurality of aperture stop sizes, and wherein the aperture stop is disposed at the fixed position of the aperture stop location, independent of the aperture stop size.

32. The lens assembly of claim 28, further comprising:

a third lens group having at least one first lens element, the at least one first lens element having a first surface proximal to the object and second surface distal to the object; and

a fourth lens group having at least one second lens element, the at least one second lens element having a first surface proximal to the object and second surface distal to the object.

33. The lens assembly of claim 32, wherein the aperture stop is disposed between the third lens group and the fourth lens group.

34. The lens assembly of claim 33, wherein the third lens group is disposed on a same side relative to the aperture stop as is the first lens group.

35. The lens assembly of claim 34, wherein the third lens group includes a third lens element and a fourth lens element.

36. The lens assembly of claim 35, wherein the third lens element is a positive lens element, and the fourth lens element is a negative lens element.

37. The lens assembly of claim 34, wherein the fourth lens group includes a fifth lens element and a sixth lens element.

38. The lens assembly of claim 37, wherein the fifth lens element is a positive lens element and the sixth lens element is a negative lens element.

39. The lens assembly of claim 32, wherein the first, second, third, and fourth lens groups define a double-Gauss-type lens.

40. The lens assembly of claim 28, further comprising at least one filter plate disposed between the second lens group and an image plane.

41. The lens assembly of claim 28, further comprising at least one electronic detector disposed at an image plane.

42. The lens assembly of claim 28, in combination with an imaging device.

43. The lens assembly of claim 42, wherein the imaging device is a security camera.

44. An optical system for imaging an abject, the optical system comprising:

a lens assembly comprising a plurality of lenses;

at least one planar plate that introduces an aberration and is in optical communication with the lens assembly; and

wherein the plurality of lenses is adapted to produce an aberration to compensate the aberration introduced by the at least one planar plate.

45. The optical system of claim 44, wherein the plurality of lenses defines a double-Gauss type lens assembly.

46. The optical system of claim 45, wherein the planar plate is a cover glass plate.

47. The optical system of claim 45, wherein the planar plate is a filter plate.

48. The optical system of claim 44, wherein the plurality of lenses comprises:

a first lens group having at least one first lens element, the at least one first lens element having a first surface proximal to the object and a second surface distal to the object; and

a second lens group having at least one second lens element, the at least one second lens element having a first surface proximal to the object and second surface distal to the object.

49. The optical system of claim 48, further comprising:

an aperture stop disposed between the first lens group and the second lens group.

50. The optical system of claim 49, wherein the aperture stop has a fixed size selectable from a range of aperture stop sizes.

51. The optical system of claim 49, wherein the aperture stop is physically contacted by at least one lens of the plurality of lenses.

52. A lens system, comprising, in order from an object side:
a first meniscus lens;
a second planar-convex lens;
a third planar-concave lens;
a fourth bi-concave lens;
a fifth bi-convex lens;
a sixth bi-convex lens; and
a first planar plate.

53. The lens system of claim 52, further comprising:
an aperture stop disposed between the third lens and the fourth lens.

54. The lens system of claim 53, wherein the aperture stop is in physical contact with each of the third and fourth lenses.

55. A lens system comprising a plurality of lens elements and an aperture stop, each lens element having a lens surface defined by a radius of curvature (r), a thickness (T), and an index of refraction (n), the plurality of lens elements being spaced from each other by a distance (h), the lens system satisfying at least on of the following conditions:

$1000 < r_4/r_2$ or $r_4 = r_2$ = approximately infinity;
$-0.56 < r_3/r_9 < -0.81$;
$0.9 < r_8/r_9 < 1.1$ or $r_8 = r_9$;
$0.9 < r_{10}/r_{11} < 1.1$ or $r_{10} = r_{11}$;
$0.7 < (h_1+h_2)/(h_3+h_4) < 1.1$;
$0.95 < h_1+h_2+h_3+h_4++T_1+T_2+T_3+T_4+T_5+T_6 < f/1.02$;
$1.71 < n_{L1},n_{L2},n_{L5}, n_{L6} < 1.79$; and
$1.67 < n_{L3},n_{L4} < 1.81$;

where:

r_2 represents a radius of curvature of an image side surface of a first lens element;

r_3 represents a radius of curvature of an object side surface of a second lens element;

r_4 represents a radius of curvature of an image side surface of the second lens element;

r_8 represents a radius of curvature of an object side surface of a fifth lens element;

r_9 represents a radius of curvature of an image side surface of the fifth lens element;

r_{10} represents a radius of curvature of an object side surface of a sixth lens element;

r_{11} represents a radius of curvature of an image side surface of the sixth lens element;

h_1 represents a gap distance between the image side surface of the first lens element to the object side surface of the second lens element;

h_2 represents a gap distance between the image side surface of a third lens element to the aperture stop;

h_3 represents a gap distance between the aperture stop to an object side surface of a fourth lens element;

h_4 represents a gap distance between the image side surface of the fifth lens element to the object side surface of the sixth lens element;

T_1 represents a thickness of the first lens element;

T_2 represents a thickness of the second lens element;

T_3 represents a thickness of the third lens element;

T_4 represents a thickness of the fourth lens element;

T_5 represents a thickness of the fifth lens element;

T_6 represents a thickness of the sixth lens element;

n_{L1} represents an index of refraction of the first lens element;

n_{L2} represents an index of refraction of the second lens element;

n_{L3} represents an index of refraction of the third lens element;
n_{L4} represents an index of refraction of the fourth lens element;
n_{L5} represents an index of refraction of the fifth lens element; and
n_{L6} represents an index of refraction of the sixth lens element.

56. The lens system according to claim 55, further comprising a focal length of approximately 10 mm.

57. The lens system according to claim 55, in combination with an aperture stop having a size selected from a plurality of aperture stop sizes.

58. The combination according to claim 67, wherein the plurality of aperture stop sizes comprises f11, f8, f 5.6, f4, f2.8.

59. The lens system according to claim 55, the lens system satisfying each of the conditions.

60. The lens system according to claim 55, the lens system satisfying a plurality of the conditions.

61. A lens assembly comprising a plurality of lens elements, and an aperture stop having a size selected from a plurality of aperture stop sizes, the aperture stop optically cooperating with the plurality of lens elements regardless of the aperture stop size, such that a lens assembler may select an aperture stop for use with the lens assembly without reconfiguring a physical relationship of the plurality of lenses.